

WHAT IS CLAIMED IS:

1. A device for forming a random set of playing cards comprising:
 - 5 a top surface and a bottom surface of said device;
 - a single card receiving area for receiving an initial set of playing cards;
 - a randomizing system for randomizing the order of an initial set of playing cards;
 - a collection surface in a card collection area for receiving randomized playing
 - cards one at a time into the card collection area, the collection surface receiving cards so
 - 10 that all cards are received below the top surface of the device;
 - an image capture device that reads the rank and suit of each card before being
 - received on the card collection surface;
 - an elevator for raising the collection surface so that at least some randomized
 - cards are elevated at least to the top surface of the device; and
 - 15 a moveable cover over the elevator.
2. The device of claim 1 wherein the elevator raises all randomized cards above the top
- surface of the device and the moveable cover is automatically raised to allow the
- randomized cards to rise above the top surface of the device.
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3. The device of claim 1 wherein at least one pick-off roller removes cards one at a time
- from the card receiving area and moves cards one at a time towards the randomizing
- system and the image capture device can read a card only after it has been moved by the
- at least one pick-off roller.
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4. The device of claim 3 wherein at least one pair of rollers receives each card from the
- at least one pick-off roller before the image capture device can read each card.

5. The device of claim 4 wherein a microprocessor controls movement of the pick-off roller and the at least one pair of rollers.
6. The device of claim 4 wherein when a first card being moved by the pick-off roller is being moved by the at least one pair of rollers, movement of the pick-off roller is altered so that no card other than the first card is moved by either the pick-off roller or the at least one pair of rollers.
7. The device of claim 1 wherein the randomization system moves one card at a time into an area overlying the collection surface after the one card has been read for suit and rank.
8. The device of claim 1 wherein one card at a time is positioned into a randomized set of playing cards over the collection surface.
9. The device of claim 17 wherein the collection area is bordered on two opposed sides by two movable card gripping elements.
10. The device of claim 9 wherein an insertion point to the card collection area is located below a bottom edge of the two movable card gripping elements.
11. The device of claim 9 wherein the card collection surface is vertically positionable within the card collection area.
12. The device of claim 11 wherein the card collection surface is moved by a motivator that is able to move incremental vertical distances that are less than the thickness of a playing card.
13. The device of claim 12 wherein the motor is a stepper motor or an analog motor.

14. The device of claim 1 wherein a sensor is present along a line of movement of cards in the device within the single card receiving area or adjacent the single card receiving area and after the image capture device, the sensor indicating a trigger position of a moving card to initiate a timed capture of an image by the image capture device.

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15. The device of claim 14 wherein at least one microprocessor is present in the device and the at least one microprocessor controls vertical movement of the card collection surface and camera triggering.

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16. The device of claim 14 wherein at least a second sensor identifies the position of the card collection surface so as to place a top card in the collection area at a position that is level with or above the bottom of at least one card gripping element that is movable from at least one side of the collection area towards playing cards within the card collection area.

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17. The device of claim 15 wherein the microprocessor is programmed to determine a distance that the card collection surface must be vertically moved to position at least one specific card at a bottom edge of the at least one card gripping element when the card gripping element moves to contact cards within the card collection area.

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18. The device of claim 16 wherein the at least one card gripping element comprises at least two gripping elements, at least one of which moves from a side of the collection area towards playing cards within the card collection area.

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19. The device of claim 25 wherein the microprocessor directs movement of an individual card into a gap in cards in the collection area between two segments of cards created by support of cards by at least one card gripping element.

20. The device of claim 17 wherein the microprocessor is programmed to lower the card collection surface within the card collection area after the at least one element has contacted and supported cards within the card collection area, creating two segments of cards and a gap between the segments.

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21. The device of claim 20 wherein the microprocessor directs movement of an individual card into the gap, between the two segments of cards.

22. The device of claim 1 wherein a microprocessor is controllably connected to the device, the microprocessor directing movement of playing card moving elements within the device, the microprocessor randomly assigning potential positions for each card within the initial set of playing cards, and then directing the device to arrange the initial set of playing cards into those randomly assigned potential positions to form a randomized final set of playing cards with each card in the randomized set having been read for at least rank.

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23. A device for forming a random set of playing cards comprising:

a top surface and a bottom surface of said device;

a receiving area for an initial set of playing cards;

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a randomizing system for randomizing initial set of playing cards;

a collection surface in a card collection area for receiving randomized playing cards;

an elevator for raising the collection surface within the card collection area;

at least one card supporting element within the card collection area that will

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support a predetermined number of cards within the card collection area; and

an image capture system that can read at least the rank of each at least one card before it is inserted into a set of cards at a position below the predetermined number of cards.

24. The device of claim 23 wherein an at least one card supporting element comprises an element on at least one side of the card collection area that can move inwardly within the card collection area to contact and support the predetermined number of cards within the card collection area.

25. The device of claim 24 wherein the at least one card supporting element comprises at least two opposed card supporting elements that move inwardly within the card collection area to contact and support the predetermined number of cards within the card collection area.

26. The device of claim 23 wherein a microprocessor is communicatively connected to the device and the microprocessor is programmed to determine a distance that the card collection surface must be vertically moved to position at least one specific card position other than the top card at a bottom edge of the at least one card supporting element when the card supporting element moves to contact cards within the card collection area.

27. The device of claim 24 wherein a microprocessor communicatively connected to the device is programmed to lower the card collection surface within the card collection area after the at least one card supporting element has contacted and supported cards within the card collection area, creating two segments of cards and a gap between the segments.

28. The device of claim 27 wherein the microprocessor directs movement of an individual card into the gap between the two segments of cards.

29. The device of claim 23 wherein a memory records the reading of each at least one card inserted into a set of cards and the position of each card within the final set of cards is identified to create an index of all cards in a final set of cards.

30. A device for forming a random set of playing cards comprising:

- a top surface and a bottom surface of said device;
- a single card receiving area for receiving an initial set of playing cards;
- a randomizing system for randomizing the order of an initial set of playing cards;
- 5 a collection surface in a card collection area for receiving randomized playing

cards one at a time into the card collection area, the collection surface receiving cards so that all cards are received below the top surface of the device;

an image capture device that reads the rank and suit of each card after it has begun leaving the single card receiving area and before being received on the card collection
10 surface;

an elevator for raising the collection surface so that at least some randomized cards are elevated at least to the top surface of the device; and

a moveable cover over the elevator.

15 31. An automatic card shuffling device comprising:

- a microprocessor with memory for controlling the operation of the device;
- an in-feed compartment for receiving cards to be randomized;
- a card moving mechanism for moving cards individually from the in-feed

compartment into a card mixing compartment;

20 an image capture system that can identify at least the rank of each card as it is moved towards, into or through the card mixing compartment, but before removal from the device;

a card mixing compartment that identifies a position for each card in each set of cards formed in the card mixing compartment,

25 a memory that records at least the rank of each card in each set of cards formed in the card mixing compartment; wherein the card mixing compartment comprises a plurality of substantially vertical supports, an opening for the passage of cards from the in-feed compartment, a moveable lower support surface; at least one stationary gripping

element, a lower edge proximate the opening, the gripping arm capable of suspending cards above the opening; and

an elevator for raising and lowering the moveable support surface..

5 32. The device of claim 31 wherein the image capture system identifies at least suit and rank for each card as it is moved towards, into or through the card mixing department, but before removal from the device.

10 33. The device of claim 31 wherein a final set of cards comprising all cards and at least fifty-two cards in the device are recorded in memory informationally connected to the device with respect to position within the final set and at least the rank of each card in the final set of cards.

15 34. The device of claim 33 wherein suit and rank of each card in the final set of cards is recorded.

20 35. The device of claim 34 wherein a position of the elevator is randomly selectable and the support surface is movable to the selected position, and after the gripping element grasps at least one side of the cards, the elevator lowers, creating a space beneath the gripping element, wherein a card is moved from the in-feed compartment through the opening and into the space, thereby randomizing the cards.

25 36. The device of claim 35 wherein two stationary gripping elements are provided to grip opposite sides of a set of cards in the mixing compartment.

37. A method of randomizing a group of cards, comprising the steps of:
 placing a group of cards to be randomized into a card in-feed tray;

removing cards individually from the card in-feed tray and delivering the cards into a card collection area, the card collection area having a moveable lower surface, and a stationary opening for receiving cards from the in-feed tray;

elevating the moveable lower surface to a randomly determined height;

5 grasping at least one edge of a group of cards in the card collection area at a point just above the stationary opening;

lowering the moveable lower surface to create an opening in a stack of cards formed on the lower surface, the opening located just beneath a lowermost point where the cards are grasped;

10 inserting a card removed from the in-feed tray into the opening;

after randomizing all cards, elevating a collection of randomized cards; and

reading at least the rank of each card after it is individually removed from the card in-feed tray and before it has been inserted into the opening.

15 38. The method of claim 37 wherein after a card has been inserted, and when a presence of at least one additional card in the card in-feed tray is sensed, the elevator moves to another randomly determined height, creating another opening.

20 39. A method of arranging a group of cards into a desired order in a computer controlled automatic card shuffler, the card shuffler comprising an in-feed tray, a feed mechanism, a card arranging area, a retaining device for suspending cards in the card arranging area, a lower support surface in the card arranging area and an elevator for raising and lowering the lower support surface, the method comprising:

a) assigning each card in the in-feed tray a final order;

25 b) feeding each card individually into the card arranging area after at least the rank of each card has been mechanically read to form a final set of cards.

40. The method of claim 39 wherein the lower support surface is lowered beneath an elevation of the card feed mechanism when the computer instructs that the card being fed is to be placed on top of the stack,

5 a) suspending all cards in the card arranging area by means of the retaining device when the computer instructs that the card being fed is to be placed on the bottom of the stack, and

10 b) instructing the elevator to move, causing the lower support surface to adjust to a preselected elevation, retaining a subgroup of cards above a feed elevation and lowering the lower surface, creating an opening, and placing a card between the subgroup of suspended cards and the remaining cards supported by the lower support surface.

15 41. The method of claim 39 wherein the final order is random and each individual card in the final set of cards is identified by at least rank and position within the final set of cards.

42. The method of claim 41 wherein each individual card in the final set of cards is identified by at least rank, suit and position within the final set of cards.

20 43. An automatic card shuffler comprising:
a housing capable of being mounted into a gaming table surface;
a card receiver for accepting a group of cards to be shuffled;
a randomizing system for randomizing the order of an initial set of playing cards wherein an image capture device identifies at least the rank of each card in the initial set of playing cards before each card is positioned on a collection
25 surface for receiving randomized cards;
the collection surface for receiving randomized cards;
an elevator for raising the collection surface to an elevation proximate the gaming table surface; and
a microprocessor for controlling the operation of the card shuffler.

44. The automatic card shuffler of claim 43 further comprising an automatically movable cover that is closed at least part of the time over at least one of the card receiver and collection surface.

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45. An automatic card shuffler, comprising:

a microprocessor;

a card randomization mechanism;

a controller for controlling the card randomization mechanism by means of a user-manipulated remote control device; and

a card moving sequence programmed in memory that enables the automatic card shuffler to move a set of cards from a card receiving position to a card collection area in the shuffler in a non-shuffling event, and to read the rank and suit of each card between the card receiving position and the card collection area in the non-shuffling event.

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46. A device for forming a random set of playing cards comprising:

a top surface and a bottom surface of said device;

a single card receiving area for receiving an initial set of playing cards;

a randomizing system for randomizing the order of an initial set of playing cards;

a single collection surface in a card collection area for receiving randomized playing cards one at a time into the single card collection area to form a single randomized set of playing cards, the single collection surface receiving cards so that all playing cards from the initial set of playing cards are received below the top surface of the device;

an image capture device that reads the rank and suit of each card after it has begun leaving the single card receiving area and before being received on the single card collection surface; and

access for removal of the single randomized set of playing cards as a complete set.

47. The device of claim 46 wherein the playing card collection surface comprises a surface that is moved by an elevator.

5 48. The device of claim 47 wherein an elevator for raising the playing card collection surface so that at least some randomized cards are elevated above to the top surface of the device for removal as the access.

10 49. The device of claim 48 wherein there is an automatically moveable cover over the elevator as part of the access.

50. The device of claim 46 wherein multiple playing cards are present only in the single card receiving area and the single card collection area

15 51. The device of claim 1 wherein a program is embedded in memory in the device that can be activated to move cards from the card receiving area to the card collection area without randomization, the rank and suit of each card being read between the card receiving area and the card collection area to verify the content of a complete set of cards placed into the card receiving area.

20 52. The automatic card shuffler of claim 43 wherein a program is embedded in memory in the device that can be activated to move cards from the card receiving area to the card collection area without randomization, the rank and suit of each card being read between the card receiving area and the card collection area to verify the content of a complete set
25 of cards placed into the card receiving area.

53. The device of claim 46 wherein a program is embedded in memory in the device that can be activated to move cards from the card receiving area to the card collection area without randomization, the rank and suit of each card being read between the card

receiving area and the card collection area to verify the content of a complete set of cards placed into the card receiving area.

54. A device for shuffling cards, comprising:

- 5 a card receiving area for receiving an initial set of unshuffled cards;
- a card randomizing system for randomizing an order of the cards;
- a first sensor for sensing a position of cards between the card receiving area and
- the card randomizing system; a second sensor for sensing rank and/or suit of each card;
- and a microprocessor that activates the second sensor upon receiving a card present
- 10 signal from the first sensor.